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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/432,485	11/01/1999	GARY S. STRUMOLO	198-1226	1111

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DANIEL H BLISS
BLISS MCGLYNN PC
2075 WEST BIG BEAVER ROAD
SUITE 600
TROY, MI 48084

EXAMINER	
JONES, HUGH M	
ART UNIT	PAPER NUMBER
2123	

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.	Applicant(s)
09/432,485	Strumolo et al.
Examiner	**Art Unit**
Hugh Jones	2123

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136 (a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1) ☒ Responsive to communication(s) filed on 11/1/1999 & 3/13/2001 .

2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.

3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11; 453 O.G. 213.

Disposition of Claims

4) ☒ Claim(s) 1-6 is/are pending in the application.

4a) Of the above, claim(s) _____ is/are withdrawn from consideration.

5) ☐ Claim(s) _____ is/are allowed.

6) ☒ Claim(s) 1-6 is/are rejected.

7) ☐ Claim(s) _____ is/are objected to.

8) ☐ Claims _____ are subject to restriction and/or election requirement.

Application Papers

9) ☐ The specification is objected to by the Examiner.

10) ☐ The drawing(s) filed on _____ is/are a) ☐ accepted or b) ☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13) ☐ Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a) ☐ All b) ☐ Some* c) ☐ None of:

1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____ .
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

*See the attached detailed Office action for a list of the certified copies not received.

14) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).

a) ☐ The translation of the foreign language provisional application has been received.

15) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☑ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s). 2, 5
4) ☐ Interview Summary (PTO-413) Paper No(s). _____
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other:

DETAILED ACTION

1. Claims 1-6 of US Application 09/432,485, filed 11/1/1999, are presented for examination.

Claim Interpretation

2. Applicant are claiming use of a particle injector in a *simulation* of particle (paint droplets) impact on a simulated automobile using simulated sources. Claim 5, for example, recites "repositioning the paint spray gun...". In so far as a study of the specification and the claim preamble indicates that Applicants are claiming a simulation, the Examiner interprets that "repositioning" refers to changing the *simulated* position of the *simulated* source.

3. The Examiner notes that the claim preambles recite "designing a vehicle"; however, the claims are directed to painting a previously designed vehicle. Furthermore, the Examiner interprets that the claims fundamentally disclose simulation of paint droplet flow past an object, wherein it is intended to apply the paint to a vehicle. It is noted that a recitation of the intended use of the claimed invention must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim. In a claim drawn to a process of making, the intended use must result in a manipulative difference as compared to the prior art. See *In re Casey*, 152 USPQ 235 (CCPA 1967) and *In re Otto*, 136 USPQ 458, 459 (CCPA 1963). Applicants are claiming an intended use for their earlier disclosure relating to simulation of particle flow past a simulated automobile.

Double Patenting

4. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970);and, *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

5. A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

6. Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

7. Claims 1-6 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-4 of U.S. Patent No. 6,263,300. Although the conflicting claims are not identical, they are not patentably distinct from each other because they are both directed at simulation of particle flow past an automobile. The '300 patent recites that a tire patch is the particle source and does not disclose that the source emits paint

droplets. It would have been obvious to one of ordinary skill in the art at the time of the invention to model paint droplet flow past an automobile because this would result in cost reductions as the paint would be applied more efficiently. In any case, a recitation of the intended use of the claimed invention must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim. In a claim drawn to a process of making, the intended use must result in a manipulative difference as compared to the prior art. See *In re Casey*, 152 USPQ 235 (CCPA 1967) and *In re Otto*, 136 USPQ 458, 459 (CCPA 1963). Applicants are claiming an intended use for their earlier disclosure relating to simulation of particle flow past a simulated automobile.

Claim Rejections - 35 USC § 102

8. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless -
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.
>
> (e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

9. The changes made to 35 U.S.C. 102(e) by the American Inventors Protection Act of 1999 (AIPA) do not apply to the examination of this application as the application being examined was not (1) filed on or after November 29, 2000, or (2) voluntarily published under 35 U.S.C. 122(b). Therefore, this application is examined under 35 U.S.C. 102(e) prior to the amendment by the AIPA (pre-AIPA 35 U.S.C. 102(e)).

10. Claims 1-6 are rejected under 35 U.S.C. 102(b) as being clearly anticipated by Miller et al. (Applicant's IDS).

11. Miller et al. disclose transient CFD simulations of a bell sprayer, including: "PowerFlow" (section 2.1 - particle simulation); SpraySim (section 2.2 - droplet flow simulation); relocatable sources and paint trajectories (figures 1-5).

12. Claims 1-6 are rejected under 35 U.S.C. 102(e) as being clearly anticipated by Strumolo et al (US Patent 6,263,300).

13. The applied reference has a common inventor and assignee with the instant application. Based upon the earlier effective U.S. filing date of the reference, it constitutes prior art under 35 U.S.C. 102(e). This rejection might be overcome by: (1) a showing under 37 CFR 1.132 that any invention disclosed but not claimed in the reference was derived from the inventor of this application and is thus not an invention "by another"; (2) a showing of a date of invention for the claimed subject matter of the application which corresponds to subject matter disclosed but not claimed in the reference, prior to the effective U.S. filing date of the reference under 37 CFR 1.131; or (3) an oath or declaration under 37 CFR 1.130 stating that the application and reference

are currently owned by the same party and that the inventor named in the application is the prior inventor under 35 U.S.C. 104, together with a terminal disclaimer in accordance with 37 CFR 1.321(c). For applications filed on or after November 29, 1999, this rejection might also be overcome by showing that the subject matter of the reference and the claimed invention were, at the time the invention was made, owned by the same person or subject to an obligation of assignment to the same person. See MPEP § 706.02(l)(1) and § 706.02(l)(2).

14. Strumolo et al (US Patent 6,263,300) discloses a method and system for aiding in the design of an automotive vehicle enables dynamic placement of particle injection points into a flow domain to permit visual observation and alteration of resulting particle trajectories with respect to a computer aided design model representative of the vehicle. Various particle trajectories, representing windshield washer spray, water droplets along the vehicle surface, and the like can be simulated relative to the vehicle surface with or without the influence of a flow field around the vehicle surface to evaluate a vehicle design, compare alternate designs and compare results from physical aerodynamic tests to predicted results. See fig. 1 (particle simulator); fig. 2 (droplet parameters); figs. 3-4, 7, 11 (GUI); fig. 10-11 (trajectories); col. 3, line 55 to col. 5, line 30 (paint droplet flow); and placement of particle source (fig. 1).

Claim Rejections - 35 USC § 103

15. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

16. Claims 1-6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kinema/SIM (ArSciMed, 1996) in view of Strumolo (U. S. Patent 5,568,404 - applicant) or Miller et al..

17. The claims recite simulation of particle trajectory past an automobile including details concerning the source(s) representing particle creation (wherein the particles are paint droplets).

18. Kinema/SIM (**K**) discloses: a detailed and comphrehensive particle simulation package which can model a diverse range of physical phenomena involving particle creation and sources, particle flow (taking into account the effects of gravity, electric and magnetic fields, drag, etc.) and collisions of particles with themselves or other objects and surfaces. Kinema/SIM is a software tool that presents a simulation space for particle behavior where you can construct and animate complex physical phenomena. See entire disclosure. A number of features are subsequently listed for Applicant's benefit.

- Examples of the graphical interface are shown on pp. 1-8 to 1-9;
- the "particle window" is shown on pg. 2-7; here the particle parameters can be altered;
- "Lifetime" defines the particle lifetime (pg. 2-9);
- "particle geometry" is discussed on pg. 2-11;
- "coordinate systems" are discussed on pg. 3-3;
- entering particle parameter values via slider buttons (pg. 3-10;

- probibility functions for particle speed, lifetime, emission angles (pg. 3-11);

- other relevant temporal parameters (pg. 3-16);

- GUI simulation controls (pg. 5-2);

- statistical features (ie., *group behavior* - pg. 5-3);

- particles, obstacles (pg. 5-5);

- deatils about simulation parameter values including source rate, display, particle interactions and emission sources (chapter 6);

- range of interactions between particles (pg. 6-3);

- source rate (pg. 6-4);

- a combined particle (pg. 6-5), wherein

> *"The Euler mode, on the other hand, calculates forces more globally and therefore has the advantage of maintaining simulation speed. It calculates only one force per cell at time t, which is applied to all particles in the cell. ...";*

- Chapter 7 discloses "Particles": details concerning particles; pg. 7-1 discloses:

> "Particles are the key element in Kinema/SIM simulations. They are point objects that can represent a broad range of physical and image characteristics such as mass, charge, color, motion, and geometry. In your simulation, particles can represent a diversity of real or image objects such as quantum physics particles, gas molecules, aerosol droplets, bacteria, fluid flow, dust, rain, snow, sand or pixels of images. The possibilities are as numerous as the phenomena of reality and creative animation. ... Particles are emitted into the simulation via sources which can be visible or invisible points or geometric objects positioned in simulation space. ... Parameters such as lifetime, mass, drag, and coupling will characterize your particle's dynamics and interactions in the simulation."

- particle coupling (pg. 7-1);

- particle examples (pg. 7-1), wherein

"Particles are the key element in Kinema/SIM simulations. They are point objects that can represent a broad range of physical and image characteristics such as mass, charge, color, motion and geometry. In your simulation, particles can represent a diversity of real or image objects such as quantum physics particles, gas molecules, aerosol droplets, bacteria, fluid flow, dust, rain, snow, sand, or pixels of images. The possibilities are as numerous as the phenomena of reality and creative animtion ...

... Particles are emitted into the simulation via sources which can be visible or invisible points or geometric objects positioned in simulation space. ...";

- particles parameter window (pg. 7-3 to 7-4);

- *"Sigma", a parameter related to particle-particle interactions* (pp. 7-13 to 7-14);

- decay particles (pg. 7-21);

- particle coupling (pp. 7-22 to 7-23);

- Chapter 8 (source parameters);

- sources (pg. 8-1), wherein

"Sources are orgins that emit particles into the simulation, and all particles must enter the simulation via a source. Sources can be points or have spatial geometry which you can choose to see or hide in simulation space. You can define as many sources as you like for a system, but each source is restricted to emit only one particle type. (If you want to have more than one particle type originate from the same position, you can superimpose sources at the point. ...

... In the source window you assign a particle type to the source and then define the rate and speed of the particles along with their spread angle into the simulation. ..."

- chapter 8: "Sources": details concerning sources; pg. 8-1 discloses:

"Sources are orgins that emit particles into the simulation, and all particles must enter the simulation via a source. ... Sources can represent numerous analogs linked to their emission of particles. For example, they could

represent nozzles or orifices spraying droplets or gases (particles) into the simulation, clouds releasing rain, or nuclei emitting nuclear particles. ... In the source window you assign a particle type to the source and then define the rate and speed of the particles along with their spread angle as they are emitted into the simulation. Parameters that affect the source presence and behavior in the simulation include positioning, rotation, size scaling, orientation, and emission geometry."

- source window (pg. 8-3);

- source rate (pg. 8-4);

- Spread (pg. 8-5);

- speed (pg. 8-6);

- source position (pg. 8-10);

- display (pg. 8-11);

- geometry (pg. 8-13);

- particle emission and geometry (pp. 8-15 to 8-16);

- particle generation (pp. 8-16 to 8-17);

- Chapter 9 "Obstacles": details concerning interactions of particles with macroscopic objects (an automaobile body, for instance); pg. 9-1 discloses:

"Obstacles are geometric objects placed in the system to interact with particles. You can define as many obstacles as you like for a system. An obstacle can interact with each particle in a global manner or in a specific way. For example, a global interaction may have all particles bounce off the obstacle."

- chapter 11: "The gravity fields": details concerning global constraints on particle motion, namely gravity.;

- chapter 12: "Setting up drag fields": details concerning drag fields; pg. 12-1 discloses:

"Kinema/SIM allows you to construct various types of drag fields in your simulation to introduce the force effects of moving media such as water flow and wind. The types of drag fields that can be set up with Kinema/SIM are global fields, turbulent fields, local fields, and vector flow."

- Chapter 13, "electric fields";

- Chapter 15, "particle events";

- elastic and inelastic particle collisions (pp. 15-1 to 15-2);

19. Kinema/SIM does not specifically teach simulating paint droplet particle flow past an automobile (in other words, a virtual wind tunnel).

29. Strumolo discloses a virtual wind tunnel (*In particular, note: **S**: abstract; fig. 2a, 5, 9-10, 16-19, 22; col. 1, line 59 to col. 2, line 46; col. 17, line 61 to col. 18, line 67; col. 20, lines 9-37; col. 21, line 57 to col. 22, line 52*). Strumolo does not teach particle trajectories of paint droplets but does teach simulation of particle flow past automobile bodies.

30. Miller et al. disclose transient CFD simulations of a bell sprayer, including: "PowerFlow" (section 2.1 - particle simulation); SpraySim (section 2.2 - droplet flow simulation); relocatable sources and paint trajectories (figures 1-5).

31. It would have been obvious to one of ordinary skill in the art at the time of the invention to model paint droplet flow past an automobile because this would result in cost reductions as the paint would be applied more efficiently. In any case, a recitation of the intended use of the claimed invention must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim. In a claim drawn to a

process of making, the intended use must result in a manipulative difference as compared to the prior art. See *In re Casey*, 152 USPQ 235 (CCPA 1967) and *In re Otto*, 136 USPQ 458, 459 (CCPA 1963). Applicants are claiming an intended use for their earlier disclosure relating to simulation of particle flow past a simulated automobile.

Conclusion

24. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure:

- ***Bryson et al.*** disclose the design and implementation of a virtual environment linked to a graphics workstation for the visualization of complex fluid flows are described. The system user wears a stereo head-tracked display, which effectively displays 3-D information, and an instrumented glove to intuitively position flow-visualization tools. The visualization structures and their interfaces in the virtual environment and the implementation hardware and software are described. The performance of the virtual wind tunnel is reviewed using the flow past a tapered cylinder as an example. Performance issues and future directions for the system are discussed.

- ***Ma et al.*** disclose a technique for computer visualization of simultaneous three-dimensional vector and scalar fields such as velocity and temperature in reacting fluid flow fields. The technique, which is called Virtual Smoke, simulates the use of colored smoke for experimental gaseous fluid flow visualization. However, it is noninvasive and can animate, in particular, the dynamic behaviors of steady-state or instantaneous flow fields obtained from

numerical simulations. Virtual Smoke is based on volume seeds and volume seedlings, which are direct volume visualization methods previously developed for highly interactive scalar volume data exploration. Data from combustion simulations are used to demonstrate the effectiveness of Virtual Smoke.

25. Any inquiry concerning this communication or earlier communications from the examiner should be:

directed to:

Dr. Hugh Jones telephone number (703) 305-0023, Monday-Thursday 0830 to 0700 ET, ***or*** the examiner's supervisor, Kevin Teska, telephone number (703) 305-9704. Any inquiry of a general nature or relating to the status of this application should be directed to the Group receptionist, telephone number (703) 305-3900.

mailed to:

Commissioner of Patents and Trademarks
Washington, D.C. 20231

or faxed to:

(703) 308-9051 (for formal communications intended for entry)

or (703) 308-1396 (for informal or draft communications, please label "*PROPOSED*" or "*DRAFT*").

Dr. Hugh Jones
May 5, 2002

DR. HUGH M. JONES
PATENT EXAMINER
ART UNIT 2123